CORDLESS CAP LAMP WITH LITHIUM-ION POLYMER BATTERY

KSE-LIGHTS GmbH

CORDLESS MINERS CAP LAMP

This is the world´s first cordless miners' cap lamp.

The combination of Lithium-Ion Polymer and Light Emitting Diodes (LED) now allow us to produce a cordless miners' cap lamp which is light, small and very cost-saving.

The cordless miners cap lamp is maintenance free.

The cordless miners' cap lamp is the lightest in the world with a weight of 140 grams.

LEDs have a durability of some 30 years.

LEDs produce a white light and do not generate any heat. The use of nine LEDs produces a strong beam of light, which lasts indefinitely as long as power is being supplied.

No specially ventilated room is required to recharge the cordless miners' cap lamp. Even an enclosed cabinet can be used.

The cordless miners cap lamp is housed in a Polycarbonate case (Makrolon®) which is 100% waterproof.

Each cordless miners cap lamp is supplied with 10 protective film layers, which are used to protect the light field from damage.

Each cordless miners cap lamp is supplied with a single charging unit or alternatively charging banks are available for the storage and charging of the lamps.

For mines, a 34 cordless miners cap lamp charging bank or a 200 cordless miners cap lamp charging bank can be supplied. The charging bank can be plugged into a normal 230 Volt 16 Amp socket.

The cordless miners cap lamp will save the mines tens of thousands of Euro annually as recharging requires 10 times less electricity than the conventional battery charger which requires a tremendous amount of power.

The only "Don´t" is: Don´t charge underground.

STRUCTURE AND FUNCTION

(1) Powerswitch for 8 outer LEDs

(2) Powerswitch for center LED (Emergency light)

(3) Waterproofing tongue and groove seal

(4) Polycarbonate protective housing

(5) Light Emitting Diode (LED)

(6) Red light LED Indicators showing charging

(7) Reflector optimising Lumen output of the lamp

(8) Identification plate

(9) Rubber plug to protect the charger input

(10) Black silicone sealant to prevent unauthorized opening

(11) Cap clip for fixing the lamp to a helmet

(12) Serial number

Technical Parameters:	
Power source	Lithium Battery, 3.7V - 2.8 Ah
Charging time	< 7 hours
Charger input	AC 110V - 230V
Charger output	DC 4,7V <600mA
Working current	180mA
Working hours	≥ 15 hours
Emergency Hours	≥ 120 hours
Illumination after 15hours	≥ 800 lux
Weight	140g
Working Temperature	-20°C - 60°C
Battery longevity	After 500 times recharging ≥80% Capacity
Limited warranty	2 years
Explosion proof mode	CE 0158 Ex I M1 EEx ia I + CE 0158 Ex I M2 Ex ia I

Type plate of the LED cap lamp


Lamp with a neckband

POWER SOURCES – A BRIEF SUMMARY

Lead Acid Cells

Nominal 2.0V per cell, large capacities, but lead is very toxic, heavy maintenance, a major weight disadvantage.

Nickel-Cadmium (Ni-Cd)

1.2V per cell, used extensively in rechargeable situations. Because of memory build-up these cells are either continuously trickle charged or recharged only after complete discharge.
Nickel-Cadmium can be recharged many times which makes them very popular.
Nickel-Cadmium is very toxic; it would seem a good idea to avoid it where possible, despite an established track record.
In the meantime it is forbidden to produce and sell Nickel-Cadmium cells.

Nickel Metal Hydride (NiMh)

1.22V per cell, a new generation to replace Ni-Cd and have a higher energy density and longer life cycle and don't exhibit a memory effect. They do not contain the most dangerous heavy metal and are therefore more environmentally friendly than the predecessor. The main disadvantage is lower charge life cycle and if proper charge and discharge steps are not vigorously enforced this cell will perform even more poorly than the Ni-Cd cells.
Total discharge will destroy the NiMh cells.

Lithium Ion

Lithium Ion have twice the energy density of Ni-Cd and 50% more than Nickel Metal Hydride (NiMh) and are therefore much lighter and smaller with the same capacity. They can be recharged approximately 1 000 times and have a low impact on the environment, but are more expensive to manufacture.

M1 Certificate

IBExU Institut für Sicherheitstechnik GmbH
An-Institut der TU Bergakademie Freiberg

[1] **1st Addition to**
EC-TYPE EXAMINATION CERTIFICATE IBExU06ATEX1080
- Translation -

[2] Equipment: LED-Head lamp type KS5500

[3] Manufacturer: KSE-LIGHTS GmbH

[4] Address: Sonnenstr. 46b
58135 Hagen
GERMANY

[5] **Addition / Alteration**
The LED-Head lamp mentioned under [2] can be modified as type KS5700 for use in areas of mines susceptible to firedamp (Equipment group I, Category M1).

[6] **Test Report**
The explosion proof protection of the addition stated under [5] is documented in the Test Report IB-06-3-192 from 17th July 2006. The test documents are component of the Test Report and listed there.

[7] **Test result**
IBExU certifies, that the equipment stated under [2] fulfills the in Annex II of the RL 94/9/EC fixed Essential Health and Safety Requirements by accordance with EN 50014:1997+A1+A2, EN 50020:2002 and EN 50303:2000.

The LED-Head lamp type KS5700 fulfills the requirements of explosion protection for electrical equipment in type of protection Intrinsically safety, Equipment group I, Category M1.

The marking of the equipment stated under [2] shall include the following:

Ex I M1 EEx ia I
$-20\ °C \leq T_a \leq +60\ °C$

Instruction for safety use
Charing only outside of explosive atmospheres

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Authorized for certifications
- Explosion protection -

By order

(Dr. Lösch)

Zertifizierungsstelle Explosionsschutz * IBExU Institut für Sicherheitstechnik GmbH * Kenn-Nr. 0637 *

- Seal -
(Identification No. 0637)

Freiberg, 17th July 2006

Certificates without signature and seal aren't valid.
Certificates may only be duplicated completely and unchanged.
In case of dispute, the German text shall prevail.

M2 Certificate, Page1

IBExU Institut für Sicherheitstechnik GmbH
An-Institut der TU Bergakademie Freiberg

[1] **EC-TYPE EXAMINATION CERTIFICATE**
according to Directive 94/9/EC, Annex III
(Translation)

[2] Equipment and Protective Systems intended for use in Potentially Explosive Atmospheres, **Directive 94/9/EC**

[3] EC-Type Examination Certificate Number: **IBExU06ATEX1080**

[4] Equipment: LED-Head lamp
Type KS5500 and KS5600

[5] Manufacturer: KSE-LIGHTS GmbH

[6] Address: Sonnenstr. 46b
58135 Hagen
GERMANY

[7] The design of the equipment mentioned under [4] and any acceptable variation thereto are specified in the schedule to this EC-Type Examination Certificate.

[8] IBExU Institut für Sicherheitstechnik GmbH, NOTIFIED BODY number 0637 in accordance with article 9 of the Council Directive 94/9/EC of 23rd March 1994, certifies that the equipment mentioned under [4] has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of the equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.
The test results are recorded in test report IB-05-3-134 of 15th May 2006.

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN 60079-0:2004 and E IEC 60079-11:2002.

[10] If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified under [17] in the schedule to this EC-Type Examination Certificate.

[11] This EC-Type Examination Certificate relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the manufacture and supply of this equipment.

[12] The marking of the equipment mentioned under [4] shall include the following:

Ex I M2 Ex ia I resp. **Ex II 2G Ex ib IIC T3**

$-20\ °C \leq T_a \leq 60\ °C$

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Authorised for certifications
- Explosion protection -

By order

(Dr. Lösch)

Zertifizierungsstelle Explosionsschutz IBExU Institut für Sicherheitstechnik GmbH Kenn-Nr. 0637
- Seal -
(ID no. 0637)

Freiberg, 15th May 2006

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Schedule

M2 Certificate, Page2

IBExU Institut für Sicherheitstechnik GmbH
An-Institut der TU Bergakademie Freiberg

[13] **Schedule**

[14] **to EC-TYPE EXAMINATION CERTIFICATE IBExU06ATEX1080**

[15] **Description of equipment**

The LED-Head lamp consists of a compact enclosure of plastic with a mounting device for helmets. It contains the rechargeable battery with protection electronics and a switched LED-lighting array. It is not intended for opening. The charging of the battery must be outside of the explosion hazardous area.

Technical data

Ambient temperature range	-20 °C to +60 °C
Degree of protection	≥ IP 54
Battery cell	Lithium-polymer (IEC 61960) type OL183450AR250; 2500 mAh resp. 2x ICR18500SM; 2800 mAh U_N = 3.7 V
Charging voltage	max. 5.1 V
Charging current	max. 600 mA

[16] **Test Report**

The proof of the explosion protection is recorded in the test report IB-05-3-134.
The test and information documents are part of the test report and listed there.

[17] **Special conditions**

none

[18] **Essential health and safety requirements**

Confirmed by compliance of norms (see [9]).

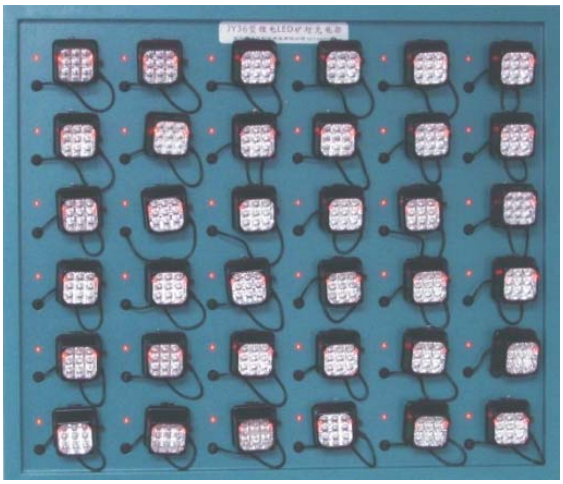
By order

(Dr. Lösch)

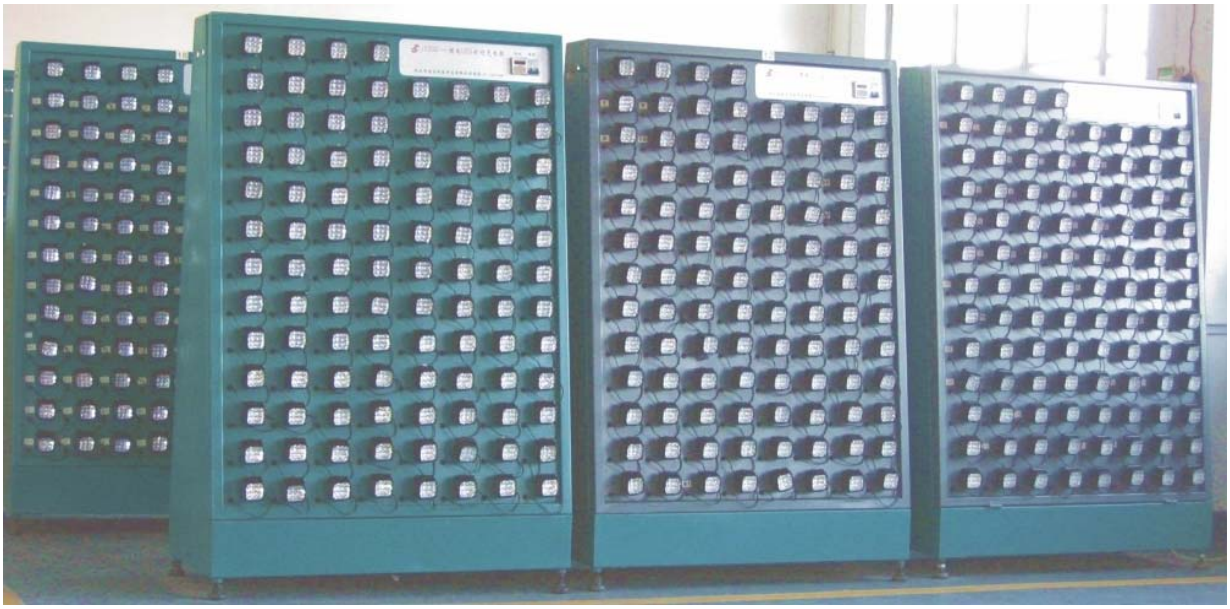
Freiberg, 15th May 2005

Single charger

Charging bank for 34 lamps



Charging bank for 200 lamps



The lamp

3D-Front view

Side view

Bottom side view

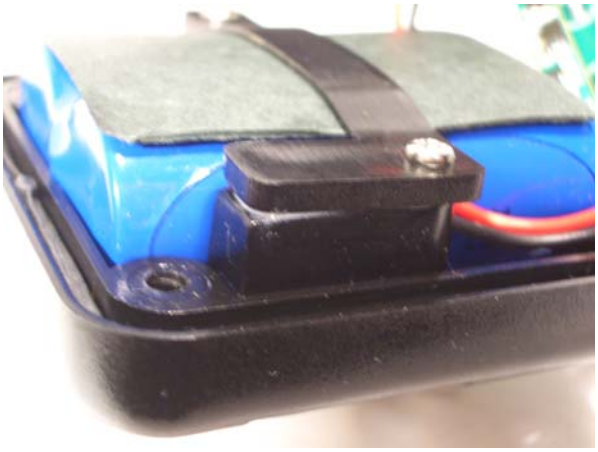
Back view, charging connection

Detail of the lamp holder

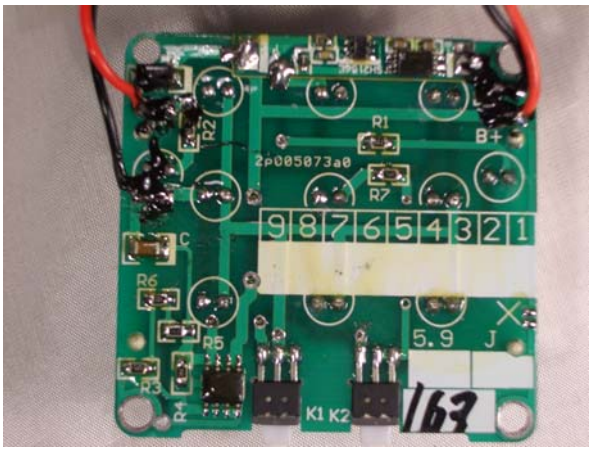
Lamp holder

Inside the lamp

The reflector with the LEDs



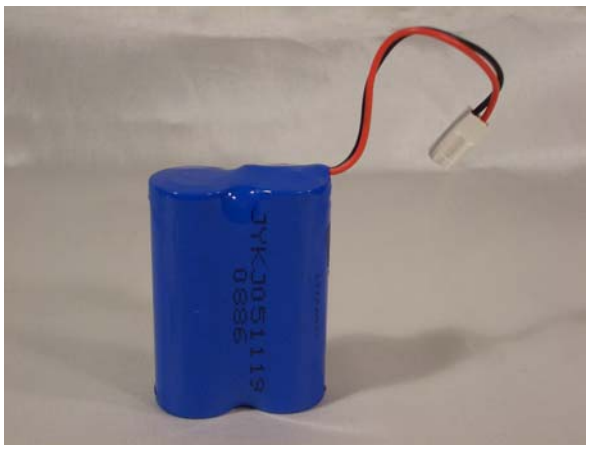
Battery with tbe backside of the charging jack



The plate (M2)

The housing

The backside of the switch panel



The battery